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## (54) RECORDING SHEET

(57)Abstract:

PURPOSE: To provide a recording sheet in which ink absorbency and glossiness are improved in the sheet in which an image can be formed by ink jet recording, etc.

CONSTITUTION: A recording sheet comprises an opaque support and a colorant receiving layer provided on the support, wherein the surface of the support at the side provided with the layer has glossiness of 70% or more and the layer is made of silica particles having mean primary particle size of 10nm or smaller and a water-soluble resin.

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CLAIMS

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[Claim(s)]

[Claim 1] The sheet for record with which it is the record sheet which consists of a color-material acceptance layer prepared on an opaque base material and on it, and the near front face in which the color-material acceptance layer of this opaque base material is prepared has 70% or more of glossiness, and this color-material acceptance layer is characterized by being the layer which primary [ an average of ] particle diameter becomes from a silica particle and water soluble resin 10nm or less.

[Claim 2] The sheet for record according to claim 1 with which this opaque base material has the enveloping layer of polyolefine on the near front face in which a color-material acceptance layer is prepared.

[Claim 3] The sheet for record according to claim 1 which has the enveloping layer of the polyolefine with which this opaque base material contains white pigments on the near front face in which a color-material acceptance layer is prepared.

[Claim 4] The sheet for record according to claim 1 with which this opaque base material consists of an enveloping layer of the polyolefine containing paper and the white pigments formed in the near front face in which the color-material acceptance layer is prepared.

[Claim 5] The sheet for record according to claim 1 with which this opaque base material consists of an enveloping layer of the enveloping layer polyolefine of the polyolefine containing white plastic film and the white pigments formed in the near front face in which the color-material acceptance layer is prepared.

[Claim 6] The sheet for record according to claim 1 with which this opaque base material contains the metal thin layer prepared in the near front face in which white plastic film and its color-material acceptance layer are prepared.

[Claim 7] The sheet for record according to claim 1 with which this color-material acceptance layer has 50 - 80% of voidage.

[Claim 8] The sheet for record according to claim 1 with which the weight ratio of a silica particle 10nm or less and water soluble resin has this primary [ an average of ] particle diameter in the range of 1.5:1-10:1.

[Claim 9] The sheet for record according to claim 1 which is a sheet for ink jet record.

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## DETAILED DESCRIPTION

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### [Detailed Description of the Invention]

[0001]

[Industrial Application] This invention relates to the sheet for record suitable for carrying out image formation using color material. It is related with the sheet for record for forming the image sheet of high gloss by ink jet record especially.

[0002]

[Description of the Prior Art] In recent years, the record approach and equipment which various information processing system was developed and fitted each information system are also developed and adopted with rapid development of an information industry. It miniaturizes, there is also no noise and the equipment used in such a record approach in the thermal-ink-transfer-printing record using the ink record using an ink jet or a plotter and melting mold color material, or sublimation mold color material has become a light weight and the thing excellent also in operability and maintainability. Furthermore, the equipment used by such record approach is widely used from colorization being easy recently. Moreover, colorization progresses also in record of the conventional electrophotography method, and the full color printer and the copying machine have been developed and commercialized with high resolution.

[0003] An ink jet method has three sorts, the approach using the coloring matter solution (water color ink) which roughly divides in physical properties and contains water-soluble coloring matter, the approach using the coloring matter solution (oily ink) containing oil solubility coloring matter, and the method of carrying out thermofusion of the low-melt point solid wax (wax ink) containing coloring matter, and using it, although various kinds of methods are developed. The mainstream is a type which uses water color ink. Anyway, it is the approach of making breathe out a liquefied particle drop and forming an image on the sheet for record.

[0004] In the above-mentioned ink jet record, when obtaining a minute image, liquefied ink is absorbed early, and it is required that there is neither an ink blot nor ink \*\*\*\*\*. Furthermore, while the hard copy which formed the image in the sheet for ink jet record has the above-mentioned minute image, it is required that glossiness should also be high. That is, when the film photo which is the ideal of hard copy is considered, high glossiness is the important technical problem which should be attained.

[0005] In order to improve the above-mentioned ink absorptivity, various proposals are made from the former. For example, in the case of ink jet record, use of an absorptivity polymer is proposed by the color-material absorption layer, and use of solubility or the bloating tendency matter is proposed by JP,56-80489,A at JP,55-146786,A, and use of many polymer systems (polyvinyl alcohol (PVA), a polyvinyl pyrrolidone (PVP), polyethylene oxide (PEO), carboxymethyl cellulose (CMC)) is proposed. However, the pass-through effect of the water color ink by the hydrophilic radical or dissociative radical of a polymer was used, even if it thickened the film for this reason, sufficient ink rate of absorption was not obtained, and these absorptivity ingredients had inadequate control of a color mixture blot.

[0006] Moreover, the approach of carrying out ink absorption by capillarity is proposed by JP,63-22997,B, JP,63-56876,B, JP,3-21357,B, JP,3-48867,B, JP,57-14091,A, JP,60-61286,A, JP,60-214989,A, JP,61-22983,A, and JP,62-227684,A by using a color-material acceptance layer as

porous membrane. Although the color-material acceptance layer of such porous membrane is comparatively high about ink absorptivity since the aperture of porous membrane is too large according to examination of this invention person -- light -- dispersion (diffraction scattering -- ) To the pan with which high gloss is not obtained when Mie scattering was carried out, and it considers as a record sheet, since optical transparency was low The method of using a porosity inorganic pigment for a color-material acceptance layer JP,55-144172,A, It is proposed by JP,56-148584,A, JP,56-148585,A, JP,62-273881,A, JP,3-24906,B, JP,60-245588,A, etc. High gloss is not obtained, when light scattering happens and it considers as a record sheet, since the color-material acceptance layer which consists of these porosity inorganic pigments also has a too large particle size of a pigment according to examination of this invention person. Moreover, the approach of using it, making condense the gaseous-phase method silica of 10-30nm of diameters of a primary particle secondarily is proposed by JP,3-56552,B. However, according to examination of this invention person, in the color-material acceptance layer which used the porosity inorganic pigment as which only such a refractive index or particle diameter was specified, since [ that a refractive index was large or ] particle diameter was large, sufficient transparency was not acquired. Moreover, the record sheet with which the color-material acceptance layer which has a detailed hole using a pseudo-boehmite system particle was formed is indicated by JP,2-276670,A and JP,3-281383,A. According to examination of this invention person, these were good about ink absorptivity, but since a refractive index was as high as about 1.65, sufficient transparency was not acquired.

[0007] Therefore, in the sheet for ink jet record, the high (that is, high gloss is obtained) color-material acceptance layer of transparency with good and ink absorptivity is not obtained. Moreover, as a base material of the sheet for ink jet record given in the above-mentioned official report, it is paper of fine quality, a report grade paper, plastic film, etc. of low glossiness (15% or less), and is opaque, and there is no publication that a glossy base material is used, and these official reports indicate the means for raising ink absorptivity.

[0008] In addition to the paper of fine quality of the above-mentioned low glossiness (15% or less), and a report grade paper, from the former, the art paper of high gloss, coat paper, cast coated paper, etc. are used as a base material of the sheet for ink jet record. The record form with which surface glossiness has the coat of the polyvinyl alcohol over which the bridge was constructed on 80% or more of cast coated paper in JP,6-155892,A as a sheet for ink jet record of high gloss, for example is indicated. However, by the coat of the polyvinyl alcohol with which the bridge was constructed over the color-material acceptance layer, although glossiness with such an expensive record form is obtained, as mentioned above, sufficient ink absorptivity is not acquired. Moreover, the record material which prepared the layer which uses a pseudo-boehmite system particle as a color-material acceptance layer on the resin sheet containing white pigments, and has a detailed hole in JP,6-199035,A is indicated. However, highly [ glossiness ] enough, as the layer of a pseudo-boehmite system particle was mentioned above, although ink absorptivity is good, since its light transmission nature is not enough, it cannot be said to be the record material of high gloss by the resin sheet of this record material.

[0009]

[Problem(s) to be Solved by the Invention] this invention person came examination in piles variously, in order to obtain the sheet for ink jet record which can form a quality (it has sharpness by high gloss) image especially. Consequently, it became clear that the color-material acceptance layer which consists of the silica particle and water soluble resin of the specification which shows good ink absorptivity and high light transmission nature was solvable by preparing on an opaque base material with surface high glossiness.

[0010] Therefore, this invention is the sheet for record which can form an image sheet image by ink jet record, thermal transfer recording, or electrophotography record, and it aims at offering the sheet for record which can form a sharp image. Especially this invention is the sheet for record whose ink absorptivity and glossiness which can form an image by ink jet record improved, and it aims at offering the sheet for record which can form a sharp image.

[0011]

[Means for Solving the Problem] The above-mentioned purpose is a record sheet which consists



of a color-material acceptance layer prepared an opaque base material and on it, the near front face in which the color-material acceptance layer of this opaque base material is prepared has 70% or more of glossiness, and this color-material acceptance layer can attain it with the sheet for record characterized by being the layer which primary [ an average of ] particle diameter becomes from a silica particle and water soluble resin 10nm or less.

[0012] The above-mentioned glossiness is JIS. It is the value calculated by measuring according to the approach of a publication to P-8142 (75-degree specular gloss test method of paper and the paper board).

[0013] The desirable mode of the sheet for record of this invention is as follows.

- 1) An opaque base material has the enveloping layer of polyolefine on the near front face in which a color-material acceptance layer is prepared.
- 2) It has the enveloping layer of the polyolefine with which an opaque base material contains white pigments on the near front face in which a color-material acceptance layer is prepared.
- 3) The above-mentioned opaque base material consists of an enveloping layer of paper and the polyolefine (white pigments are contained preferably) prepared in the near front face in which the color-material acceptance layer is prepared.
- 4) The above-mentioned opaque base material consists of an enveloping layer (white pigments are contained preferably) of white plastic film and the polyolefine prepared in the near front face in which the color-material acceptance layer is prepared.
- 5) The above-mentioned opaque base material contains the metal thin layer prepared in the near front face in which white plastic film and its color-material acceptance layer are prepared (base material which white plastic film with a metal thin layer used the metal thin layer as the front face, and was preferably pasted up on one [ at least ] front face of double-sided polyethylene paper).
- 6) The above-mentioned opaque base material is a base material used for a film photo.
- 7) The above-mentioned color-material acceptance layer has 50 - 80% of voidage.
- 8) The weight ratio of a silica particle 10nm or less and water soluble resin has the above-mentioned primary [ an average of ] particle diameter in the range of 1.5:1-10:1.
- 9) The above-mentioned primary [ an average of ] particle diameter is less than (preferably 3-9nm) 10nm.
- 10) The above-mentioned color-material acceptance layer has the pore which has the average diameter of 5-30nm.
- 11) The above-mentioned silica particle is 2 1nm to a front face. It is the silicic anhydride which has the silanol group of 2-3 hits.
- 12) The above-mentioned sheet for record is an object for ink jets.

[0014] The sheet for record of this invention has the basic configuration which consists of a color-material acceptance layer prepared in one front face of an opaque base material and a base material. A color-material acceptance layer may be prepared in both sides of a base material.

[0015] The sheet for record of this invention can be manufactured as follows, for example. As an opaque base material, it is opaque, and if the glossiness of the near front face in which a color-material acceptance layer is prepared at least is the sheet which it has 70% or more, the sheet of arbitration can be used. Paper of high gloss, such as a baryta paper used for art paper, coat paper, cast coated paper, the base material for film photos, etc.; Polyester, such as polyethylene terephthalate (PET) Cellulose ester, such as a nitrocellulose, cellulose acetate, and cellulose acetate butylate With furthermore, plastic film, such as polysulfone, polyphenylene oxide, polyimide, a polycarbonate, and a polyamide The film of the high gloss which this film was made to contain white pigments etc. and carried out opacity to it (performing surface calender processing etc.), or white pigments are contained on the front face of content plastics, such as the above-mentioned paper, the above-mentioned transparence plastic film, or white pigments, - it is -- it is -- the base material with which the enveloping layer of the polyolefine which is not contained was prepared can be mentioned.

[0016] The special kind paper in which the above-mentioned baryta paper, polyolefine coat paper (a kind of the base material with which the enveloping layer of polyolefine was prepared), or a

metal vacuum evaporation layer currently used as a base material for film photos was prepared can be suitably used by this invention. The enveloping layer of the polyolefine containing polyolefine or white pigments is formed in the near front face in which the color-material acceptance layer of paper and an opaque sheet plastic is prepared, and the opaque base material of this invention has a desirable base material. Even if it uses a transparence sheet plastic, an opaque base material is obtained, in the case of the enveloping layer of the polyolefine with which the enveloping layer of polyolefine contains white pigments, it is \*\*, and it can also use this by this invention. As white pigments, a titanium dioxide, a calcium carbonate, and a zinc oxide can be mentioned. It is a titanium dioxide preferably. Furthermore, a color pigment, a fluorescent brightener, an antioxidant, etc. may be added.

[0017] The paper containing the enveloping layer which consists of a metal thin layer prepared in a polyolefine coat paper, b polyolefine coat plastic film and c white plastic film, and its front face as a desirable example of the opaque base material of this invention can be mentioned.

a) The base material for film photos which consists of an enveloping layer which consists of paper and polyolefine prepared in the front face as polyolefine coat paper, and consists of a polyethylene layer containing the titanium oxide which carried out size press processing of the stencil paper given in JP,4-149432,A, for example, was prepared in the front face can be mentioned. Especially limitation does not have the paper used for polyolefine coat paper, and anythings can be used for it. For example, it can obtain by adding and carrying out paper making of a loading material, a sizing compound, the paper reinforcing agent, etc. by using natural pulp as the main raw material. In this way, polyolefine coat paper can be manufactured by extruding polyolefine on the front face of the obtained stencil paper, and covering with coating (the extruder and laminator for polyolefines being used). As polyolefin resin, polymers and such mixture, such as high density polyethylene, low density polyethylene, and polypropylene, can be mentioned. High density polyethylene, low density polyethylene, and such mixture are desirable. As for the molecular weight of such polyolefines, 20000-200000 are desirable. The thickness of a polyolefin resin layer has desirable 15-50 micrometers. In polyolefin resin, white pigments, a color pigment, a fluorescent brightener, an antioxidant, etc. may be added.

b) It consists of an enveloping layer which consists of white plastic film and polyolefine prepared in the front face as polyolefine coat plastic film, and the base material for film photos which prepared the low-density-polyethylene layer which contains a high-density-polyethylene layer in one side, and contains titanium oxide in another side on the front face of calcium-carbonate content polyester film given in JP,3-214343,A can be mentioned. It is white plastic film, the plastic film of the above-mentioned polyolefine coat plastic film has polyester resin, such as polyethylene terephthalate, polystyrene, and a desirable polyvinyl chloride as the polymer ingredient, and especially its polyester is desirable. White plastic film makes for example, the above-mentioned polymer contain an inorganic pigment, and can be created by making a void (detailed air bubbles) form by extension by mixing other polymers, such as polystyrene, and making a void (detailed air bubbles) form into (JP,3-76727,A) or polyester resin (JP,54-29550,B). And a polyolefine coat can be formed like Above a.

c) The base material for film photos which white plastic film with a metal thin layer used the metal thin layer as the front face, and was pasted up, for example on the front face of double-sided polyethylene paper given in JP,6-10242,A as white plastic film and paper containing the metal thin layer prepared in the front face can be mentioned. Generally metal thin layers are metal vacuum evaporation film, such as aluminum, and the layer of the copolymer containing a vinyl chloride and/or a vinylidene chloride is further formed on it.

[0018] a and b are desirable in these and especially a is desirable. Although the opaque transparence base material of this invention has 70% or more of glossiness, it is desirable. [ 80% or more of ] Its thickness of an opaque transparence base material is easy to deal with a 50-200-micrometer thing and is desirable although there is especially no limit.

[0019] The color-material acceptance layer of this invention can be formed as follows. A color-material acceptance layer can be formed by applying to the front face of a transparence base material, or the front face of the resin film of acid resistibility the coating liquid which distributed non-subtlety particles, such as a silica particle, to the binder, and drying. As a binder of a color-

material acceptance layer, it is desirable to use water soluble resin. As an example of water soluble resin, as resin which has hydroxyl as a hydrophilic structural unit polyvinyl alcohol (PVA) and cellulose system resin (methyl cellulose (MC) — Ethyl cellulose (EC), hydroxyethyl cellulose (HEC), A carboxymethyl cellulose (CMC) etc. chitins and starch as resin which has; ether linkage Polyethylene oxide (PEO), Polyacrylamide (PAAM) and a polyvinyl pyrrolidone (PVP) can be mentioned as resin which has; an amide group, and amide association for polypropylene oxide (PPO), a polyethylene glycol (PEG), and polyvinyl ether (PVE). Moreover, the poly allylamine (PAA) which has the polystyrene sulfonate salt which has; sulfone radical for the polyacrylate which has a carboxyl group as a dissociative radical, maleic resin, alginate, and gelatin, the amino group, an imino group, tertiary amine, and the 4th ammonium salt, polyethyleneimine (PEI), an epoxidation polyamide (EPAm), polyvinyl pyridine, and gelatin can be mentioned.

[0020] In this invention, 10nm or less (preferably 3–9nm) silica particle is used for the first [ an average of ] particle diameter as a non-subtlety particle. The refractive index of the silica particle of about 1.45 is still more desirable.

[0021] the hydrogen bond according [ a silica particle ] to a surface silanol group — particles — adhesion — being easy — a sake — above — an average of 1 — since the structure where voidage is large can be formed when order particle diameter is 10nm or less, it is desirable to use the silica which has such a particle size, and thereby, ink receptiveness and transparency are markedly alike, and improve. A silica particle is divided roughly into a wet method and dry process according to a manufacturing method. The method of a wet method of the acidolysis of a silicate generating active silica, carrying out the polymerization of this moderately, carrying out flocking settling, and obtaining a water silica is in use. One dry-process silica has a method in use of obtaining an anhydrous silica by the approach (arc process) of carrying out heating hydride generation of the approach (flame hydrolysis), silica sand, and corks by elevated-temperature gaseous-phase hydrolysis of silicon halide with an arc in an electric furnace, and oxidizing this with air. In the case of a silicic anhydride (anhydrous silica), especially voidage is easy to form the high three-dimensional structure and is desirable [ a silica ] although these water silicas and an anhydrous silica show the property from which there was the difference of the consistency of a surface silanol group, the existence of a hole, etc., and it differed. This reason is 2 5–8 pieces/nm, when the consistency of a surface silanol group is a water silica, although it is not clear. Mostly, when it is easy to condense a particle densely (aggregate) and it is one anhydrous silica, it is 2 2–3 pieces/nm. Since it is few, it is presumed that it becomes \*\*\*\* flocculation (FUROKYU rate) and voidage becomes high structure.

[0022] As a non-subtlety particle, colloidal silica, a calcium silicate, a zeolite, a kaolinite, halloysite, a muscovite, talc, a calcium carbonate, a calcium sulfate, boehmite, etc. may be used together in addition to the above-mentioned silica particle.

[0023] A single material is sufficient as the silica particle and water soluble resin which mainly constitute this color-material acceptance layer, respectively, and the mixed stock of two or more materials is sufficient as them. moreover, the color-material acceptance layer may contain acid alkali as various kinds of mineral and a PH regulator, in order are alike other than this and to raise the dispersibility of a particle, although it mainly consists of the above-mentioned silica particle and water soluble resin. Moreover, various kinds of surfactants for the purpose which raises spreading fitness and surface quality may be used. In order to control surface frictional electrification and exfoliation electrification, or in order to adjust surface electric resistance in a xerography, the metallic-oxide particle with a surfactant with ion conductivity or electronic conductivity may be included. Moreover, a mordant may be used in order to fix coloring matter in ink jet record and to raise a water resisting property. Moreover, various kinds of mat agents for the purpose which reduces a surface friction property may be included. Moreover, various kinds of antioxidants for the purpose which controls degradation of color material, and an ultraviolet ray absorbent may be included.

[0024] Formation of the above-mentioned color-material acceptance layer can carry out the water solution or water dispersion (coating liquid) containing for example, the above-mentioned resin, a non-subtlety particle, etc. spreading and by carrying out stoving on a transparence base material (film). Spreading can be performed by the well-known methods of application, such as



for example, the Ayr doctor coating machine, a bread coating machine, a rod coating machine, a knife coating machine, a squeeze coating machine, a reverse roll coater, and a bar coating machine. Generally desiccation is performed for 0.5 – 30 minutes at 50–180 degrees C. hot air drying equipment — comparatively — low temperature — (— preferably, after drying for 0.5 – 3 minutes by 50 – 90 degree-C(3–8m [/second ] wind speed)), it is desirable from the point of the crack prevention at the time of desiccation of the color-material acceptance layer before spreading when especially thickness is thick to dry further comparatively at an elevated temperature (preferably 120–180 degrees C for 5 – 20 minutes). Moreover, it is possible by letting between roll nips pass under heating and pressurization after spreading and desiccation (for example, a supercalender) and by gloss calender etc. to raise surface smooth nature, transparency, and paint film reinforcement. However, decline in voidage needs to perform such processing by setting up few conditions in order to reduce voidage (namely, in order for ink absorptivity to fall).

[0025] In order [ of a color-material acceptance layer ] to raise especially transparency (a refractive index is lowered), the class of resin combined with a silica particle for that purpose is important, and especially when it is an anhydrous silica, the low saponification degree (70 – 90% of saponification degrees [ Preferably ]) PVA is suitable [ it is required to form many detailed openings, and ] in respect of light transmission nature. Although PVA has a hydroxyl group in a repeating unit, this hydroxyl group and the silanol group of a silica particle front face form hydrogen bond, and it is considered with making easy to form the three-dimensional network which makes the aggregated particle of a silica particle a chain unit. It is thought that the color-material acceptance layer of the structure where voidage is high is obtained by this. Thereby, a color-material acceptance layer with high transparency is obtained.

[0026] The above-mentioned color-material acceptance layer (transparent membrane which has many openings) has effect also to membrane structure with the big ratio (PB ratio: weight of the non-subtlety particle to the weight 1 of water soluble resin) of a silica particle and water soluble resin. If PB ratio becomes large, voidage, pore volume, and surface area (per unit weight) will become large. When 10 is exceeded, there are not film reinforcement and effectiveness over the crack at the time of desiccation, less than by 1.5, an opening is closed by resin, voidage decreases and a refractive index becomes high. For this reason, the range of 1.5–10 is suitable for PB ratio. In order to acquire high-speed ink absorptivity with an ink jet printer, as for especially PB ratio, two or more are desirable [ to touch directly by hand like especially an OHP film, it is necessary to obtain sufficient film reinforcement, as for especially PB ratio, five or less are desirable, and ], therefore the range of 2–5 is still more suitable for PB ratio. For example, the three-dimensional network which makes the aggregated particle of a silica particle a chain unit when the first [ an average of ] above particle diameter distributes completely [ PB ratio / 2–5 ] in a water solution an anhydrous silica and water soluble resin 10nm or less and carries out spreading desiccation is formed, average pore is 30nm or less, and voidage is 50% or more and pore specific volume 0.5 ml/g. Specific surface area can form easily the porous membrane of the translucency more than 100m<sup>2</sup>/g above.

[0027] the transparent membrane (color-material acceptance layer) which has the opening of above-mentioned a large number — for example, it can prepare on a base material as follows. The above-mentioned coating liquid for color-material acceptance stratification the silica particle of 10nm or less of diameters of an average primary particle underwater — adding (an example, 10 – 15 % of the weight) — a high-speed rotation wet colloid mill (an example —) After carrying out distribution for 20 minutes (usually for 10 – 30 minutes) on condition that high-speed rotation of 10000rpm (usually 5000 – 20000rpm), using a KUREA mix (M Technique Co., Ltd. make), It can obtain by adding a polyvinyl alcohol water solution (it being set to PVA of about 1/3 weight of an example and a silica like), and distributing on the still more nearly same conditions as the above. Thus, the obtained coating liquid is a homogeneity sol and can obtain the color-material acceptance layer which has a three-dimensional network by forming a spreading layer on a base material by the following method of application using this. In addition, the water which is a solvent is evaporated by drying on the occasion of formation of a color-material acceptance layer, after applying the coating liquid of the above-mentioned homogeneity



sol on a base material. When the spreading film reaches gelation concentration by this evaporation, wet gel is formed, further, when desiccation advances, porosity xerogel is formed, and the transparent membrane which has the opening of above-mentioned a large number can be obtained.

[0028] Especially the color-material acceptance layer that is the transparent membrane which has the opening of above-mentioned a large number is excellent in ink receptiveness and transparency. The minute record which absorbs ink quickly by capillarity and has neither ink NIJIMI nor ink \*\*\*\*\* is not only possible, but in ink jet record, it can paste up firmly the color material in thermal recording, and the toner in electrophotography record. This reason is because color material etc. is firmly fixed according to the geometrical anchor effect to which color material and a toner go underwater in the pore of a porous layer, and originate in a three-dimensional network as that result. In ink jet record, the thickness of a color-material acceptance layer needs to have the absorption capacity which absorbs all drops, and it is necessary to determine this in connection with the voidage of a paint film. For example, the amount of ink 8nl/mm<sup>2</sup> By the case, if voidage is 60%, film about 15 micrometers or more is needed. In in ink jet record, the range of 10-50 micrometers is desirable. Thus, although the glossiness on the color-material acceptance layer of the sheet for record obtained is also high, as for the glossiness (prescribed by said base material), it is desirable that it is 50% or more, and it is desirable that it is especially 60% or more.

[0029]

[Example]

[0030] [Example 1]

(1) Carry out paper making and dry, after carrying out beating of the mixed pulp of the production LBPK70 weight section of an opaque base material, and the NBSP30 weight section to Canadian freeness 300ml by the double disk refiner and adding the following ingredient to this pulp slurry, and it is basis-weight 180 g/m<sup>2</sup>. Stencil paper was obtained.

[0031]

Pulp 100 Weight section Epoxidation behenic acid amide The 0.3 weight section Alkyl ketene dimer The 0.4 weight section Cation starch The 1.0 weight section Polyamide polyamine epichlorohydrin The 0.2 weight sections Cationic polyacrylamide The 0.5 weight sections [0032]

It is the sizing compound (water solution) of the following presentation in the obtained stencil paper by sizing press processing 30 g/m<sup>2</sup> Sinking-in adhesion was carried out.

Polyvinyl alcohol 4 Weight section gamma-aminopropyl triethoxysilane The 0.05 weight sections Fluorescent brightener 0.6 Weight section Defoaming agent The 0.005 weight sections [0033] Subsequently, calender processing of the obtained sizing compound adhesion paper was carried out so that it might become 200 micrometers in thickness with a software calender, subsequently calender processing was carried out with the machine calender, and thickness was adjusted to 175 micrometers. Corona discharge treatment is carried out to the rear face (wire side) of stencil paper after that, and it is 3 the consistency of 0.98g/cm. Consistency 0.94 g/cm<sup>3</sup> which contains 10% of the weight of titanium oxide after coating the thickness of 25 micrometers with polyethylene and carrying out corona discharge treatment to a right face (felt side) The thickness of 30 micrometers was coated with polyethylene and the opaque base material was obtained.

[0034]

(2) Presentation of the coating liquid for color-material acceptance stratification Dry type silica particle (7nm; 10 weight section refractive index: primary [ an average of ] particle diameter : 1.45; Aerosil A300 (product made from Japanese Aerosil))

Polyvinyl alcohol (78% of saponification degrees; polymerization-degree 4500; 3.3 weight section PVA440 (Kuraray Co., Ltd. make))

Ion exchange water A 136 weight sections dry type silica particle is added to ion exchange water (73.3 weight sections). A high-speed rotation wet colloid mill (KUREA mix (M Technique Co., Ltd. make)) is used. the polyvinyl alcohol water solution (what was dissolved in the remainder 62.7 weight section of ion exchange water) after making it distribute for 20 minutes on condition that 10000rpm -- in addition, it distributed on the still more nearly same conditions as the above,

aqueous ammonia adjusted pH to 9.2, and the coating liquid for color-material acceptance stratification was obtained.

[0035] The above-mentioned coating liquid was dried for 10 minutes at 100 more degrees C, after using and applying the air knife coater to the right face (on a titanium oxide content polyethylene layer) of said opaque base material and drying for 1 minute at 70 degrees C (5m [/second ] wind speed) with hot air drying equipment. Thereby, desiccation thickness formed the color-material acceptance layer which is 30 micrometers.

[0036] The sheet for record with which the color-material acceptance layer was prepared in the opaque base material as mentioned above was obtained.

[0037] In the [example 2] example 1, the sheet for record was produced like the example 1 except having used the following base material as said opaque base material.

[0038] (1) Biaxial stretching of the polyester resin (PET) which contained the calcium carbonate with a production mean particle diameter [ of an opaque base material ] of 0.9 micrometers 15% of the weight was carried out, and it obtained to 3 and white polyester film of SRa0.17micrometer the consistency of 0.9g/cm. It is the solvent solution of the polyester resin which kneaded tin oxide 50% of the weight to both sides of this white polyester film at solid content 0.3g/m2 It is the surface electric resistance after applying and drying  $5 \times 10^8$  to  $5 \times 10^9$  The antistatic layer of omega was formed.

[0039] After carrying out corona discharge treatment to both sides of this film, melting extrusion of the high density polyethylene (consistency 0.960g/cm<sup>3</sup>, 10 MI=13g /, minutes) was carried out with the resin thickness of 30 micrometers using the melting extruder, and one antistatic layer top was covered with the resin layer of polyethylene (this field is called a rear face). Next, melting extrusion of the low density polyethylene (consistency 0.923 g/cm<sup>3</sup>, 10 MI=7g /, minutes) which used the melting extruder and contained the ultramarine blue of 15 % of the weight of anatase mold titanium dioxides and a minute amount on another [ which did not prepare a resin layer ] antistatic layer was carried out with the resin thickness of 32 micrometers, and it covered with the resin layer which has a glossy surface (this field is called a right face).

[0040] After carrying out corona discharge treatment of the high-density-polyethylene resin stratification plane on the back, an aluminum oxide (alumina ZORU -100, Nissan Chemical Industries, Ltd. make) and a silicon dioxide (the Snow tex -0, Nissan Chemical Industries, Ltd. make) are distributed in water by the weight ratio as an antistatic agent one half (alumina ZORU-100 / Snow tex -0), and it is 0.2g/m<sup>2</sup> at the weight after desiccation. It applied so that it might become.

[0041] The opaque base material was obtained as mentioned above.

[0042] In the [example 3] example 1, the sheet for record was produced like the example 1 except having used the following base material as said opaque base material.

[0043] (1) The polyethylene terephthalate film with a thickness of 25 micrometers filled up with the silica of 3 micrometers of production mean diameters of an opaque base material 2% of the weight has been arranged in vacuum deposition, vacuum deposition was performed on conditions with a degree of vacuum of 10 to 4 torrs, and the vacuum-plating-of-aluminium film whose thickness is 600A on the surface of a film was formed. The adhesives of the following presentation are diluted with ethyl acetate on the front face of this vacuum evaporationo film, and the coverage after desiccation is 5 g/m<sup>2</sup>. It applied so that it might become, and it dried in oven for 2 minutes at 100 degrees C.

(Adhesives presentation)

Vinyl chloride / vinylidene-chloride / vinyl acetate/ 56 Weight section Maleic-anhydride copolymer Tolyene diisocyanate 37 Weight section Trimethylol propane adduct Epoxidation aliphatic alkylester (molecular weight 350 [ about ]) 7 Weight \*\*\*\*\* was carried out and the film with a vacuum evaporationo layer was obtained.

[0044] After carrying out beating of the mixed pulp of the LBPK80 weight section and the NBSP20 weight section to Canadian freeness 300ml by the double disk refiner and adding the following ingredient to this pulp slurry, paper making is carried out and it dries, and it is the basis weight of 160g/m<sup>2</sup>. Stencil paper was obtained. Consistencies are 1.0 g/cm<sup>3</sup> by the ASHIN

calender. It adjusted.

[0045]

Pulp 100 Weight section Sodium stearate The 1.0 weight section Anion polyacrylamide The 0.5 weight section Aluminum sulfate The 1.5 weight section Polyamide polyamine epichlorohydrin The 0.5 weight sections Alkyl ketene dimer The 0.5 weight sections [0046] After carrying out corona discharge treatment of one side of the obtained stencil paper, melting extrusion of the low density polyethylene (consistency 0.923g/cm<sup>3</sup>, 10 MI=7g /, minutes) was carried out with the resin thickness of 30 micrometers using the melting extruder, and one field (right face) of paper was covered with the resin layer of polyethylene. Next, after carrying out corona discharge treatment of another [ which did not prepare a resin layer ] field, melting extrusion of the high density polyethylene (consistency 0.950 g/cm<sup>3</sup>, 10 MI=8g /, minutes) was carried out with the resin thickness of 30 micrometers using the melting extruder, and it covered with the resin layer (this field is called a rear face). In this way, both sides produced the paper laminated with polyethylene.

[0047] Next, the coverage after drying the polyurethane system 2 liquid type adhesives of the following presentation on the front face of the side which did not prepare the vacuum evaporation layer of the film with a vacuum evaporation layer produced previously is 3g/m<sup>2</sup>. It applied so that it might become, and it dried in oven for 2 minutes at 100 degrees C.

(Adhesives presentation)

Pori Bond AY-651A 100 Weight section (Sanyo Chemical Industries, Ltd. make)

Pori Bond AY-651C 15 Weight section (Sanyo Chemical Industries, Ltd. make)

This spreading side and the low-density-polyethylene side of the paper which both sides laminated with polyethylene were doubled, and heating sticking by pressure was carried out by pressure 20 kg/cm. It produced.

[0048] The opaque base material was obtained as mentioned above. The field which has a vacuum evaporation layer is a right face.

[0049] In the [example 1 of comparison] example 1, the sheet for record was produced like the example 1 except having used the PPC form (regular paper for electrophotography) as an opaque base material.

[0050] Commercial cast coated paper (trade name: MARIESUTO,; by Hokuetsu Paper Mills, Ltd. 80 - 88% of glossiness, the U.S. tsubo 210 - 250 g/m<sup>2</sup>) is used as a [example 2 of comparison] opaque base material, and the coverage after drying the coating liquid of the following presentation on this is 5 g/m<sup>2</sup>. It applied and dried so that it might become.

(2) Presentation of the coating liquid for color-material acceptance stratification Polyvinyl alcohol (78 - 81% 7 of saponification degrees weight section PVA420 (Kuraray Co., Ltd. make))

Water 30 Weight section [0051] The sheet for record with which the color-material acceptance layer was prepared in the opaque base material as mentioned above was obtained.

[0052] About the sheet for record obtained above, the ink jet fitness was evaluated by the following measuring methods.

(1) With the ink rate-of-absorption ink jet printer (PIXEL JET; product made from Canon), the contact press of the paper was carried out immediately after solid printing of the black to the sheet for record (after about 10 seconds), and it judged as follows by the existence of the imprint to the paper of ink.

AA: Ink was not imprinted by paper.

CC: Ink was imprinted by paper.

(2) viewing estimated the sharpness (an image -- Sharp) of an image for the image printed by the sheet for record using the same printer as the sharpness above of an image.

AA: Sharpness good BB:sharpness good CC: Poor sharpness [0053] The glossiness of the

opaque base material of an example and the example of a comparison and the sheet for record was measured for the following business.

(3) About the opaque base material and the sheet for record which were obtained in the glossiness above-mentioned example and the example of a comparison, it is JIS. According to the approach of a publication, glossiness was measured to P-8142 (75-degree specular gloss test method of paper and the paper board). That is, six test pieces were created, respectively



and it measured using the glossmeter (a digital deflection glossmeter, Suga Test Instruments Co., Ltd. make). The average of the obtained measured value was made into glossiness.

[0054]

[Table 1]

Table 1	Ink An image Glossiness (%) Rate of
absorption Sharpness Base material The sheet for record	
----- An example 1 AA AA 87 57 examples 2 AAAA 95 63 examples 3 AA AA 99 65 -----	
----- Example 1 of a comparison AA CC 6 Example of 4 comparisons 2 CC BB 81 80-----	

[0055]

[Effect of the Invention] The color-material acceptance layer which consists of a specific silica particle and a water-soluble specific binder is prepared on the opaque base material which has glossiness with the expensive sheet for record of this invention. Since surface glossiness is also high while this secures the outstanding ink receptiveness, the image formed on a color-material acceptance layer of ink jet record etc. is sharp. The polyolefine coat especially used for the base material for the photographic printing papers etc. can be used for a base material, and a sharp image with a very high feeling of gloss can be formed by preparing the above-mentioned color-material acceptance layer.

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[Translation done.]